Numericals

1. Calculate the frequency and wavelength of a photon whose energy is 55 eV.
2. A certain spectral line has wavelength 5000 Å. Calculate the energy of the photon.
3. Calculate the wavelength of a photon of energy $7x\ 10^6$ J.
4. Calculate the deBroglie wavelength associated with the automobile of mass $2\ x10^2$ Kg is moving with a speed 96 km/hr.
5. A particle of charge q and mass m is accelerated through a potential difference V. Find its deBroglie wavelength. Calculate the wavelength , if the particle is an electron and V = 50 volts.
6. Calculate the wavelength of thermal neutrons at 27^oC.
7. A proton is moving with a speed $1.5x\ 10^8$ m/sec. Find the wavelength of matter wave associated with it.
8. The deBroglie wavelength associated with an electron is 0.1 Å. Find the potential difference by which the electron is accelerated.
9. Calculate the deBroglie wavelength associated with a neutron moving with a velocity of 2000 m/sec.
10. Calculate the energy in eV corresponding to a wavelength of 1.0 Å for electron and neutron.
11. Calculate deBroglie wavelength of an electron whose kinetic energy is 30 eV.
12. Calculate the ratio of deBroglie waves associated with a proton and an electron each having the kinetic energy as 10 M eV.
13. Find the uncertainty in momentum if the uncertainty in position is 2×10^{-10} m.
14. A spherical nanoparticle has a diameter of 50 nm. Calculate its surface-to-volume ratio.

15. An excited atom has an average life-time of 10^{-8} sec. During this time period it emits a photon and returns to the ground state. What is the minimum uncertainty in the frequency of this photon?